

WE CLAIM:

1. A flexible composition useful for sealing molten metal in a mold, for disposition between an upper mold portion and a lower mold portion, comprising:

clay in an amount in the range of about 35% to about 65% by weight;

water in an amount in the range of about 5% to about 15% by weight;

a hygroscopic agent in an amount in the range of about 20% to about 60% by weight;

and

reinforcing fibers in an amount of about 0.1% to about 5% by weight.

2. A composition in accordance with claim 1 wherein the amounts are as follows:

smectite or kaolinite clay: about 40% to about 60% by weight;

water: about 7% to about 12% by weight;

hygroscopic agent: about 30% to about 50% by weight; and

reinforcing fibers: about 0.1% to about 1% by weight.

3. A composition in accordance with claim 2, wherein the clay is a kaolinite clay; or a smectite clay comprising a sodium montmorillonite clay, a sodium bentonite clay, a calcium montmorillonite clay, a calcium bentonite clay; or a combination thereof.

4. A composition in accordance with claim 3, wherein the hygroscopic agent is selected from the group consisting of acetamide MEA; corn syrup; fructose; glucose; glycerin; glycol; 1,2,6-hexanetriol; honey; hydrogenated honey; hydrogenated starch hydrolysate; inositol; ascorbic acid; lactic acid; lactose; mannitol; polyethylene glycol; polyethylene glycol pentaerythritol ether; 2,6-hexanetriol; propylene glycol; ascorbyl dipalmitate; glucamire; glycereth; pyrrolidone carboxylic acid; sodium pyrrolidone carboxylic acid; glucose glutamate; sucrose glutamate; fructose; glucuronic acid; glutamic acid; maltitol; sorbitol; methyl gluceth; inositol; polyglyceryl sorbitol; polyvinyl pyrrolidone; sucrose; urea; xylitol; and a combination thereof.

5. A composition in accordance with claim 1, wherein the reinforcing fibers comprise cotton fibers, wood fibers, paper fibers, polyester fibers or wool fibers.

6. A composition in accordance with claim 1, wherein the clay is a smectite clay.

7. A composition in accordance with claim 6, wherein the smectite clay is selected from the group consisting of Montmorillonite, Beidellite, Nontronite, Hectorite, Saponite, and mixtures thereof.

8. A composition in accordance with claim 7, wherein the reinforcing fibers are selected from the group consisting of cotton, wool, wood, paper, polyester and combinations thereof.

9. A composition in accordance with claim 1, wherein the reinforcing fibers have a diameter in the range of about 0.05 mm to about 0.25 mm and a length in the range of about 2 mm to about 40 mm.

10. A method of manufacturing a metal part comprising:

providing an upper mold portion containing an upper mold cavity having an essentially planar lower surface surrounding the upper mold cavity, and interfacing with an upper surface of a lower mold portion;

providing a lower mold portion containing a lower mold cavity in fluid communication with at least a portion of the upper mold cavity, said lower mold cavity having an essentially planar upper surface surrounding the lower mold cavity, and interfacing with the essentially planar lower surface of the upper mold portion;

disposing the fiber-reinforced clay-containing composition, in accordance with claim 1, between the interfacing surfaces of the upper and lower mold cavities to aid in reducing an amount of molten metal flowing between said interfacing surfaces adjacent to said upper and lower mold cavities;

closing the upper and lower mold portions to compress the flexible composition between the interfacing surfaces of the upper and lower mold cavities;

pouring molten metal into the mold cavity; and

allowing the molten metal to solidify to form the metal part in a shape corresponding to the upper and lower mold cavities.

11. A method in accordance with claim 10 further including the steps of:
separating the upper and lower mold portions after the molten metal has solidified;
removing the metal part from the mold;
blending the flexible composition into sand, water and a binder to form a molding sand composition; and
forming another mold cavity in the molding sand composition containing the blended flexible composition to manufacture another metal part.

12. A method in accordance with claim 10, wherein the fiber-reinforced clay composition comprises:

smectite or kaolinite clay: about 40% to about 60% by weight;
water: about 7% to about 12% by weight;
hygroscopic agent: about 30% to about 50% by weight; and
reinforcing fibers: about 0.1% to about 1% by weight.

13. A method in accordance with claim 12, wherein the clay is a sodium montmorillonite clay, a sodium bentonite clay, a calcium montmorillonite clay, a calcium bentonite clay, a kaolinite clay, or a combination thereof.

14. A method in accordance with claim 10, wherein the reinforcing fibers are cotton fibers, wood fibers, paper fibers, wool fibers, or polyester fibers.

15. A method in accordance with claim 10, wherein the reinforcing fibers have a denier in the range of about 0.05 mm to about 0.25 mm and a length in the range of about 2 mm to about 40 mm.

16. A method of manufacturing a sealing article comprising extruding a mixture comprising:

clay in an amount in the range of about 35% to about 65% by weight;

water in an amount in the range of about 5% to about 15% by weight;

a hygroscopic agent in an amount in the range of about 20% to about 60% by weight;

and

reinforcing fibers in an amount of about 0.1% to about 5% by weight.

17. A method in accordance with claim 16, wherein the sealing article is extruded in the form of a rope.